U.S. DEPARTMENT OF VETERANS AFFAIRS

Office of Information and Technology

Information Technology (IT) Roadmap
Target State Vision of the VA
Enterprise Technical Architecture (ETA)

December 28, 2012

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1 Purpose

This Department of Veterans Affairs (VA) IT Roadmap FY 2013-2020 describes VA's information technology (IT) vision. The Roadmap looks at specific emerging innovations, and projects their role and impact on future VA operations. This future (target) state view of VA's IT infrastructure environment is intended to guide enterprise-wide IT planning and decision-making. The Roadmap will play a key role in influencing VA's IT budget, technology investments, and strategic decisions necessary to transform and modernize VA's IT capabilities to ensure that VA can continue to successfully execute its mission focus in the future, and serve the nation's Veterans.

2 Background

As a depiction of VA's future IT infrastructure environment, the IT Roadmap provides the "To Be" view of the Enterprise Technical Architecture (ETA) layer of the overarching OneVA Enterprise Architecture (OneVA EA). To fully appreciate the role of the IT Roadmap, it is important to understand OneVA EA and its various components.

2.1 OneVA EA

OneVA EA is an ongoing, collaborative effort between business and technology leaders across VA's administrations and staff offices. It provides a comprehensive picture of VA's operations, capabilities and services, as well as IT capabilities and services that support them. As part of this effort, each organization within VA develops models, views, and other products demonstrating functions and capabilities within their area of responsibility. The OneVA EA model, plans, and other products guide decision-makers in identifying needs and redundancies in VA's operations and technology infrastructure, while providing solutions based on economies of scale. In turn, rules and standards established will guide the EA investment lifecycle, and assist in alignment of technology with operational and strategic priorities.

The OneVA EA is guided by a set of six global principles that have been approved by VA's Enterprise Architecture Council (EAC)[1]. These principles support VA's drive to adopt enterprise approaches to develop, and deliver services and capabilities to Veterans and VA employees. These global principles are listed on the next page:

[1] The EAC guides the evolution of the VA's Enterprise Architecture (EA) to ensure that the EA provides views and information necessary to inform decision-making. The EAC serves as the principal oversight body for VA's enterprise architecture, its implementation, and governance. Representatives from Veterans Benefits Administration (VBA), Veterans Health Administration (VHA), National Cemetery Administration (NCA) and VA's corporate offices work to ensure alignment between business and IT EA strategies. Additional information may be found at http://vaww.ea.oit.va.gov/OneVA/EAC.asp.

1	***Mission Alignment*** *- VA information, systems and processes shall be conceived, designed, operated and managed to address the veteran-centric mission needs of VA.*
2	***Data Visibility and Accessibility*** *- VA Application, Service and Data Assets shall be visible, accessible, available, understandable, and trusted to all authorized users (including unanticipated users).*
3	***Data Interoperability*** *- VA Information shall be made interoperable through data standardization, including the identification, designation, and utilization of authoritative web services accessed via designated enterprise data sources.*
4	***Infrastructure Interoperability*** *- VA IT Infrastructure shall be made interoperable through definition and enforcement of standards, interface profiles and Implementation guidance.*
5	***Information Security*** *- VA shall provide a Secure Network and IT environment for collaborative sharing of information assets (information, services, etc.) with Veterans and other partners, including (among others) federal agencies, third party service providers, academic, researchers and businesses.*
6	***Enterprise Services*** *- VA solutions shall utilize enterprise-wide standards, services and approaches to deliver seamless capabilities to Veterans, facilitate IT consolidations through reuse, and simplify the use of Veteran functions.*

Table 1 - OneVA EA Global Principles

The OneVA EA encompasses VA's full operations. It includes two distinct layers: Business Architecture and Technical Architecture as illustrated in Figure1 below:

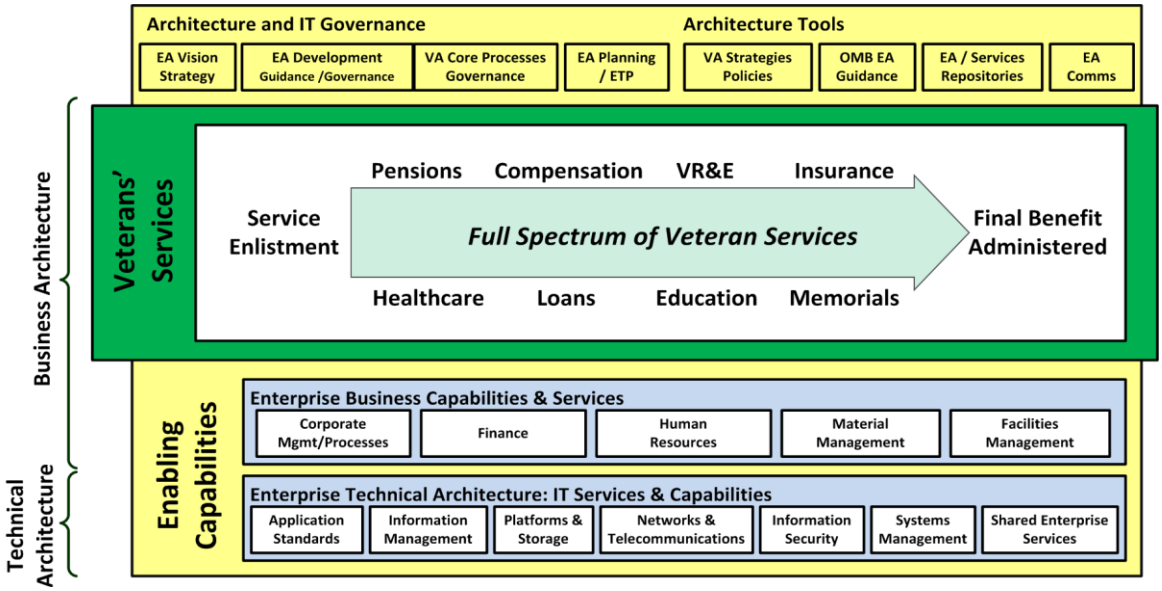

Figure 1: OneVA Enterprise Architecture (OneVA EA)

Additional information is available at the Intranet Site: http://vaww.ea.oit.va.gov

2.1.1 Business Architecture

The business layer of the OneVA EA depicts functional operations of VA's Administrations and corporate business services. Driven by VA's strategic goals and objectives, it demonstrates how services and capabilities are designed and delivered to Veterans and VA employees. Specifically, it describes the relationship between business capabilities and information flows

across VA's application environment. It is used to drive improvements in VA's operating environment through greater interoperability across VA applications, identify gaps and overlaps in service delivery, while eliminating capability redundancies. Business architecture also contains key business requirements and drivers which imply requirements for the technical layer of the OneVA EA.

2.1.2 Technical Architecture

The technical layer of the OneVA EA, also known as the Enterprise Technical Architecture (ETA), defines the IT infrastructure environment required to support VA's business application environment and achieve VA's mission objectives. It depicts VA's IT infrastructure, and contains hardware, software, principles, rules, and standards necessary for consistent development, deployment and maintenance of networks, systems, and applications. It provides for technology which is capable of secure, seamless, interactive, and efficient delivery of benefits, services, and information enterprise-wide, as well as providing internal users and mission partners with a robust and agile interoperable infrastructure.

The Office of Information and Technology (OIT) has published a variety of policies and architecture products to document rules and standards for the ETA. These documents include (among others) the Release Architecture, Enterprise Target Application Architecture (ETAA), Office of Information Security (OIS) Information Security Architecture and the Technical Reference Model (TRM).[2] Collectively, the rules and standards in these documents seek to ensure interoperability of VA's IT environment, and integrate new applications to provide seamless service of Veterans' needs. In turn, these documents are influenced by two overarching strategic documents:

- **VA IT Strategic Plan** – This plan translates overarching VA strategic goals and objectives into a set of priorities for the OIT organization and VA's overall IT environment; and

- **VA IT Roadmap** – The IT Roadmap establishes the future, "To Be", target view of the ETA. It is based on both VA'S long-term strategic goals, and global technology trends, to which all VA IT investments must be aligned.

The IT Roadmap itself is organized around the service taxonomy established in the Technical Reference Model (TRM). This taxonomy (depicted in Figure 2 below) provides a meaningful framework to identify and analyze emerging technologies, understand how these technologies can impact VA'S operations, and identify what is needed to achieve successful implementation within VA's IT environment. The IT Roadmap Framework, for the purposes of this document, is defined at Tier 1 and Tier 2. Additional information for Tier 3 and beyond may be found at http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf and http://vaww.ea.oit.va.gov/OneVA/TechnicalArchitecture.asp

[2] These documents may be found on the OneVA EA intranet side (http://vaww.ea.oit.va.gov) along with other OneVA EA products. The list is in Appendix B of this document.

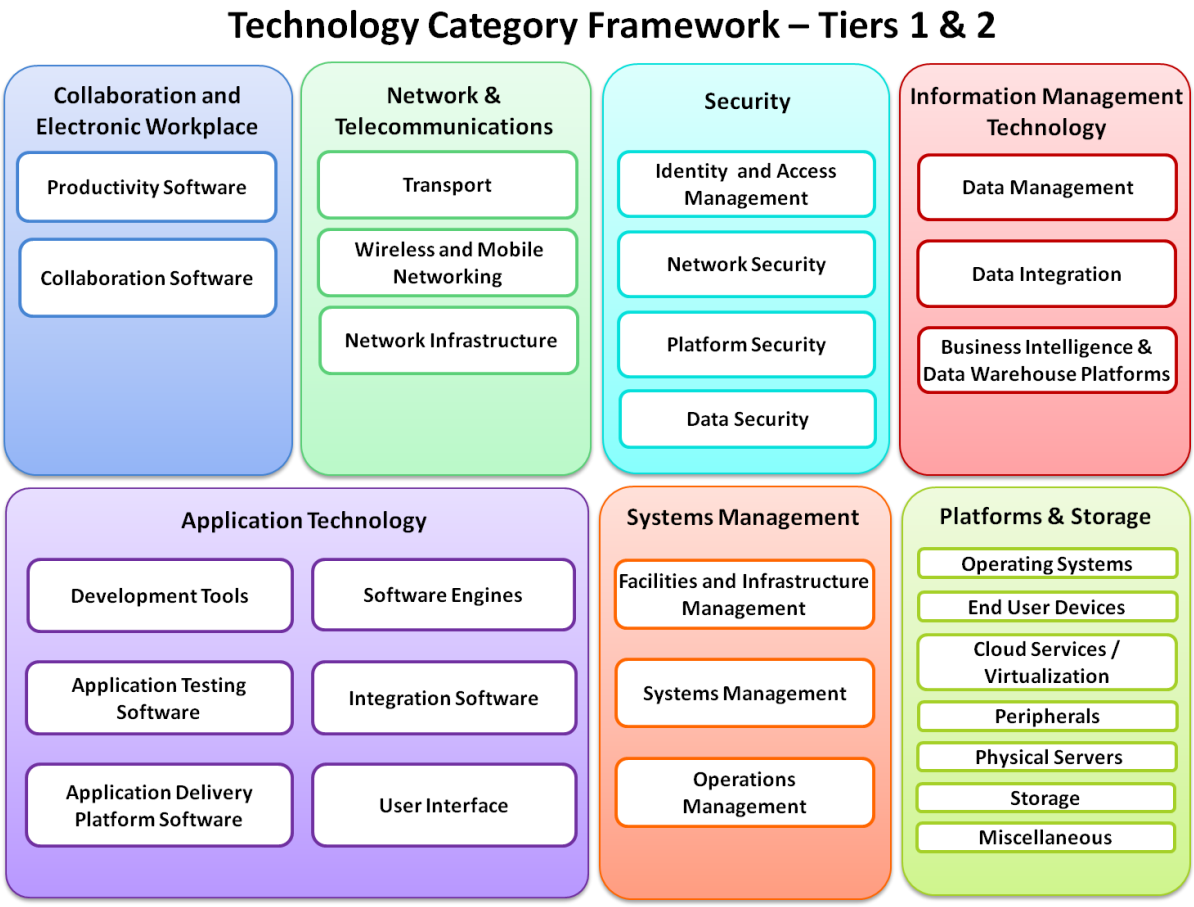

Figure 2: Technology Category Framework– Technical Reference Model (TRM) – August 2012

Collaboration and Electronic Workplace

Office productivity applications to promote sharing and collaborative work, and to facilitate productivity, are included in Collaboration and Electronic Workplace. Multi-vendor end user device support will provide Veterans, VA employees and contractors with device freedom. Adopting a Bring Your Own Device (BOYD) policy supports the goal of cost effective access to all information on any approved device within five years.

Collaboration and Electronic Workplace includes technologies listed in Figure 2 and supports the OneVA ETA sub-segment, IT Services and Capabilities.

The Platform sub-segment also includes Infrastructure As A Service (IaaS) and Software As A Service (SaaS) Cloud. The adoption of a utility computing model for server environments will provide the agile, scalable, and reliable infrastructure needed to keep pace with the explosive growth of information and increased variety and uses of VA's strategic information assets.[3]

Network and Telecommunications

This category includes all standards, software, and hardware for computer networking and telecommunications.

Network and Telecommunications supports the OneVA ETA sub-segment, IT Services and Capabilities and includes technologies listed in Figure 2.

The Network and NetOps components will provide Veterans, VA employees, and contractors with location and temporal freedom enabling access to VA information from any location at any time.

Security

Security includes standards and software to support information security (protecting data), computer security (protecting systems), and information assurance (people, products, and procedures to ensure data confidentiality, integrity, availability, assured delivery, and non-repudiation).

Security technology supports the OneVA ETA sub-segment: IT Services and Capabilities and includes technologies listed in Figure 2.

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[3] National Institute of Standards and Technology (NIST) Cloud Computing Reference Architecture, NIST SP 500-292, p6, Washington, D.C., November 1, 2011 One target for VA's IT future is to embrace a cloud computing architecture which is vendor neutral, and creates a solution that does not stifle innovation. An important question in this consideration is "Who benefits from VA moving to an SaaS, Paas, and IaaS cloud computing architecture?" The National Institute of Standards and Technology (NIST) U.S. Government Cloud Computing Technology Roadmap published in November, 2011, established parameters for widespread, on-demand access to a shared pool of computing resources, servers, data storage, applications, and services.
At a high level NIST provided examples of services available to a Cloud Consumer using SaaS, PaaS, and IaaS. SaaS benefits the Human Resources, Social Networks, Financials, Content Management, Email and Office Productivity, Document Management, Collaboration, CRM, Sales, Billing, and ERP consumer. PaaS benefits Application Deployment, Integration, Development and Testing, Business Inteligence and Database, while IaaS benefits the consumer of Services Management, Platform Hosting, Compute, Backup and Recovery, CDN and Storage

The personal/device authentication/access control and DMZ components will enable secure, seamless methods for authenticating users and devices, as well as the full protection of personal and sensitive information.

Information Management Technology

Information Management Technology (IMT) includes standards and software for the organized storage, retrieval, management, and analysis of collected data.

IMT supports the OneVA ETA sub-segment, IT Services and Capabilities, and includes the technologies listed in Figure 2.

Application Technology

Application Technology includes standards and software which (1) relate to the specification, design, construction, implementation and lifecycle management of software applications, or (2) provide application layer communication, presentation, and business logic services.

Application Technology supports the OneVA ETA sub-segment, IT Services and Capabilities, and includes technologies listed in Figure 2 above.

Benefits of Application Technology include adherence to application standards to enable faster solution development cycles and increase the velocity of deploying critical business capabilities.

Systems Management

Standards, software, and hardware for managing and administering VA's IT enterprise and its associated facilities, assets, programs, and projects are included in Systems Management.

Systems Management technologies include technologies listed in Figure 2, and support the OneVA ETA sub-segment, IT Services and Capabilities.

Platforms and Storage

Platforms and Storage include standards, hardware, and software platforms which support computing applications and data storage listed in Figure 2 above. The Platforms sub-segment also includes Infrastructure, Processing, Storage, and OS as a Service (IPSOSaaS) and Software as a Service (SaaS) Cloud. The adoption of a utility computing model for server environments will provide agile, scalable, and reliable infrastructure needed to keep pace with explosive growth of information and increased variety and uses of VA's strategic information assets. The key to adoption of this model and delivery of these benefits is VA's migration to device independent computing and commercial advances in dynamic Host/CPU storage allocation.

3 Technology Vision – "Any Device, Anywhere, Anytime"

VA is driving toward a vision whereby Veterans and their dependents, as well as VA customers and partners, will have the technology and support necessary to receive seamless services and information on "any device, anywhere, anytime."

3.1 Vision Attributes

The following list of attributes captures the essence of VA's technology vision. The technology vision provides:

1	***Device Freedom*** *- VA staff and Veterans are allowed the flexibility to utilize any approved device that may or may not be hardwired into VA's network that can be used as a portal for information for the end user or used by staff to perform their duties.*
2	***Location Freedom*** *- VA staff and Veterans are unencumbered by their physical location in accessing information.*
3	***Temporal Freedom*** *- VA staff and Veterans are able to access information at any time.*
4	***User Interface (UI) Freedom*** *- VA staff and Veterans are able to access information unencumbered by device dependent or proprietary user interfaces and standards.*
5	***Secure Authentication*** *- Devices and people are authenticated at appropriate points using separate services that are not mutually dependent.*
6	***Data Security –*** *Information is protected as it traverses through the network and kept in a data store that serves as the "single source of truth."*
7	***Browser Independent Applications –*** *Enterprise applications are built as dynamic websites that adapt to how browsers need to translate and display information.*
8	***Reusable Shared Services –*** *Enterprise applications and external partner systems utilize common services to exchange, process and present information.*
9	***Best of Breed Applications –*** *VA adopts best of breed Commercial Off the Shelf (COTS) and Government Off the Shelf (GOTS) solutions vetted through a rigorous "buy or build" governance process.*
10	***Persistent Data –*** *Shared Enterprise Data approaches combined with Enterprise CRUD (Create, Read, Update, Delete) services provide effective, efficient, and secure exchange and retention of information.*
11	***Utility Computing –*** *VA leverages technologies that allow the acquisition and provisioning of capabilities and services enabling adoption of a utility/commodity cost model.*
12	***On Demand Capacity –*** *VA leverages technologies that provide elasticity, scalability, and speed in the acquisition and provisioning of capabilities and services.*

These attributes produce outcomes which result in cost effective access, management of data, and procurement and management of applications in a smart and secure way. They also provide for increased innovation and improved quality of services across the enterprise.

The following diagram depicts the technology vision, and illustrates how new technologies are leveraged to provide an environment that effectively supports vision attributes.

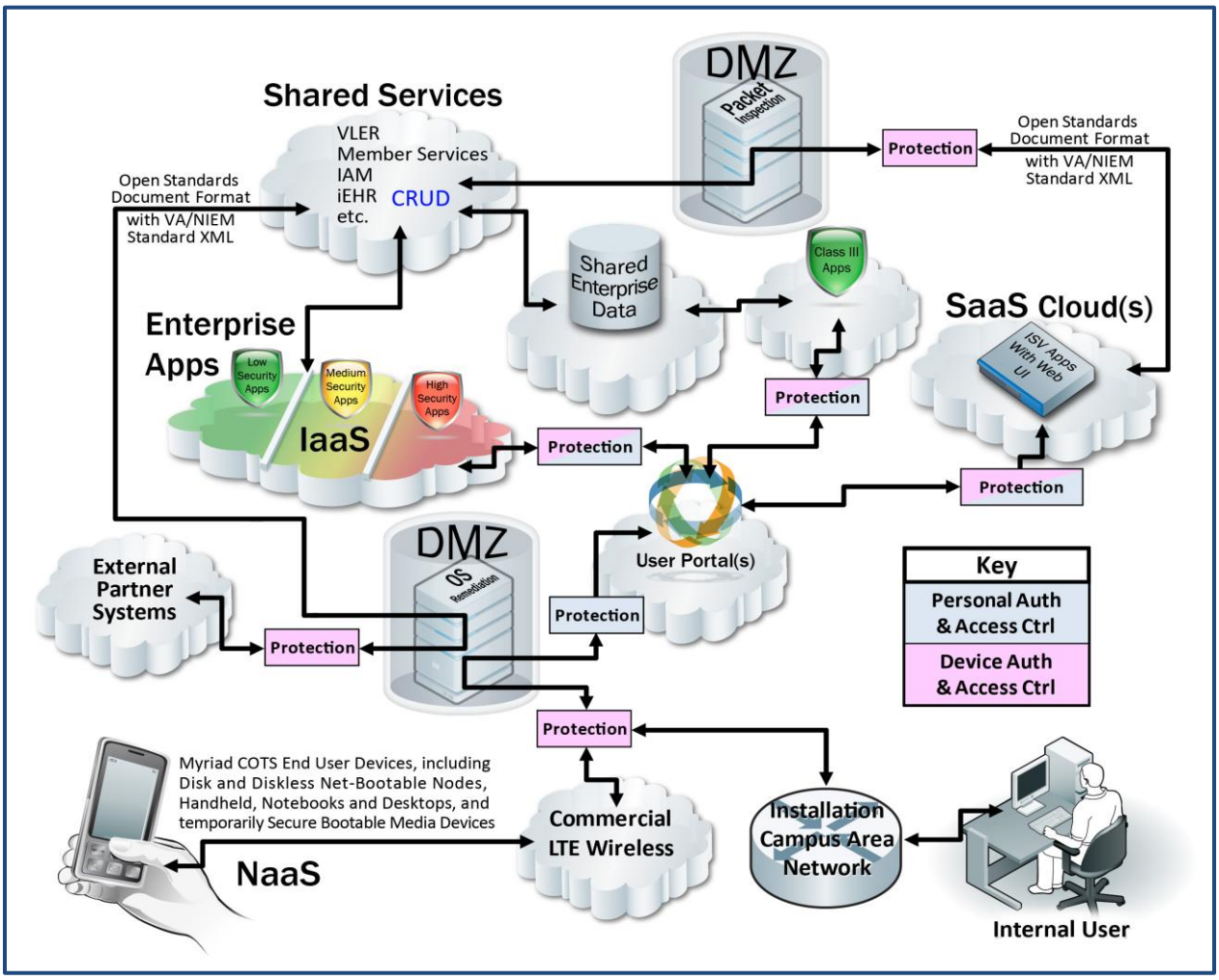


Figure 3: IT Vision Diagram

This vision illustrates a robust and secure environment that provides VA staff with the flexibility they need to become more effective and efficient at what they do. The availability of information on any device, anywhere, and anytime will help make day-to-day activities easier and less time-consuming. Internal users and mission partners are provided a robust, agile, interoperable infrastructure that provides connectivity, computing capability, and approaches for delivery of integrated services to Veterans, while supporting VA's execution of strategies.[4]

Ultimately, this vision not only will lead to more cost effective investments in technology, but also may open new doors to opportunities for service and benefits delivery that currently do not exist.

[4] VA Strategy Plan Refresh 2011 – 2015, Department of Veterans Affairs, Washington, D.C.

An approach to understanding the technical vision (as depicted in Figure 3) is to walk through its component parts and examine how they relate to the vision attributes. At a high level, vision attributes relate to four key aspects of VA's "To Be", or future state operating environment: Workplace, Security, Applications and Data, and Infrastructure.

3.1.1 The "To Be" Workplace

Workplace Vision Attributes	
1	*Device Freedom*
2	*Location Freedom*
3	*Temporal Freedom*
4	*User Interface (UI) Freedom*

Present

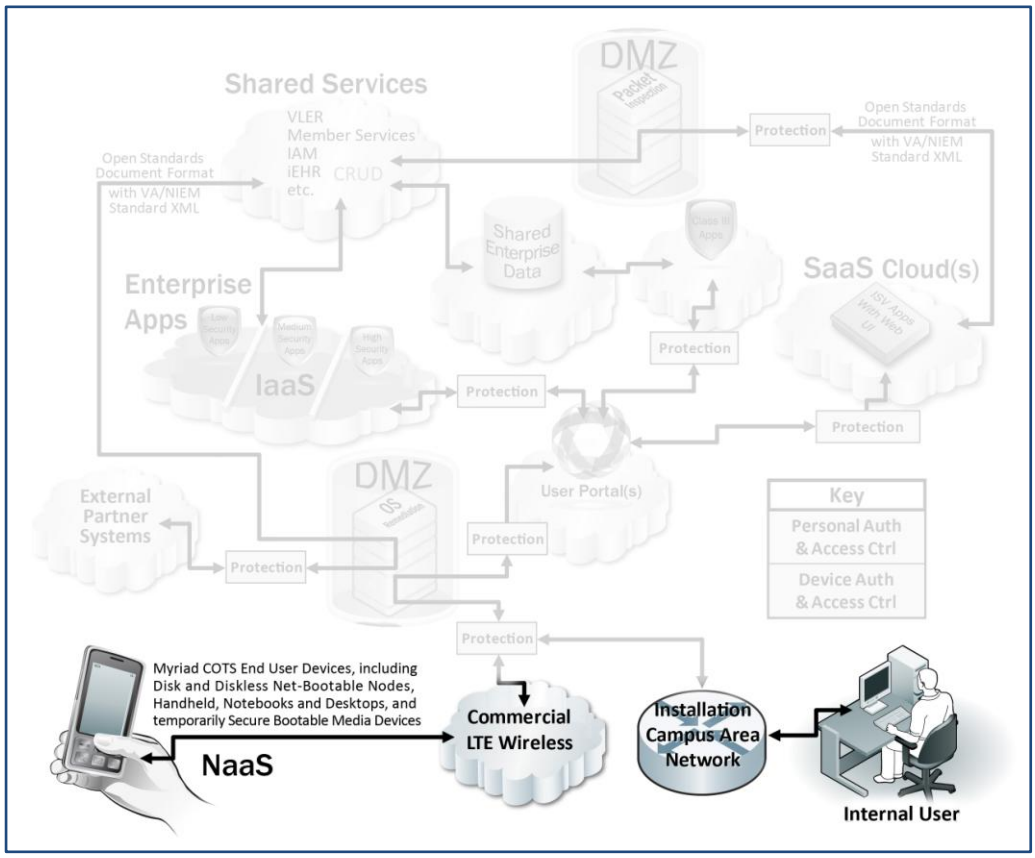
- *VA owned/provided services and devices*
- *Staff flexibility is limited*
- *Strict configuration management is required*

Key Points

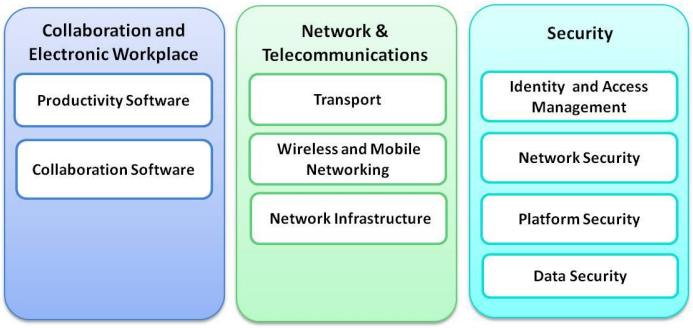
- *Change in mindset – don't need to own network and devices but protect information as it traverses through.*
- *Change in how we buy, install and manage the network*

Future

- *NaaS; Commercial Wireless*
- *Commodity cost model (devices and software)*
- *Mid-term: 50% new investments focus on "To Be"; 50% on "As Is"*
- *Long-term: 75% on "To Be"; 25% on "As Is" where more cost effective*



The IT Roadmap FY 2013-2020 entries under the categories: Collaboration and Electronic Workplace, Network & Telecommunications, and Security provide more details on the specific technologies and timelines to realize the vision of the "To Be" Workplace. See related Appendix C.



Presently, VA uses VA-owned, VA-provided services and devices. This limits flexibility and elasticity of devices, services, and staffing. This dictates strict configuration management. While configuration management is necessary, it also creates layers which limit use, quick adoption of innovative ideas for the benefit of the end user – our Veterans – and limits the manner in which VA acquires, installs and manages its networks.

Key to implementing this vision for the future workplace is a change in mindset. For instance, VA does not need to own the network and devices. VA merely needs to protect the information with which it is entrusted. It does not need to provide protection for every possible path upon which data may travel. VA needs instead to protect only the specific path over which the information packet is traveling to ensure it arrives at its destination safely.

Attributes related to the future workplace include Device, Location, Temporal and User Interface Freedom. Device Freedom gives the user the ability to bring their own device and access information from VA, as long as the device interface meets VA standards. Location Freedom means the user can access data from any location, such as an airport, home, or office, with Temporal Freedom, providing access through VA's portal 24/7 without time constraint. This results in customers being able to use "any device, anywhere, anytime."

In the future, VA's vision includes VA using Network as a Service (NaaS) and shifting to a Commodity Cost Model (devices and software) to provide for economies of scale. It is envisioned that from a near to mid-term perspective [FY 2013-2015] fifty percent of all new IT investments will focus on acquisition of technologies that support VA's "To Be" future workplace. The remaining fifty percent of allocated funds will be spent on sustaining the "As Is" systems and infrastructure where existing users connect via the traditional Campus Area Networks. In the Long-Term [FY 2013-2017][5] the future view is seventy-five percent of technology investments focused on the "To Be", and twenty-five percent of funds spent on sustainment of "As Is" existing technologies, if doing so proves to be cost effective.

The gradual move to the "To Be" workplace vision supports interoperability, openness, delivery of better, device-agnostic services at a reduced cost. The target is to make any device, anywhere, anytime a reality at a cost effective price in five years.

[5] The Technology Category Framework (Tier 1 and Tier 2) is graphically displayed in Figure 2 contained in this document, and is extracted from the Technical Reference Model (TRM) tool used by VA. The sub-segments found in Tier 2, are decomposed into Near-Term Vision (2013-2015) and Long-Term Vision (2013-2017). Long-Term vision is narrowly stated as 2015-2017; however, in the IT Roadmap output dated June 1, 2012 and the SES Retreat presentation (July 2012), there are instances which run across all time spectrums, ending in Long-Term. To be inclusive, the Long-Term time-frame is stated as 2013-2017. Where known, specific Long-Term time-frames are parenthetically stated within the technology description.

3.1.2 The Secure Target State

Security Vision Attributes	
5	*Secure Authentication*
6	*Data Security*

Present

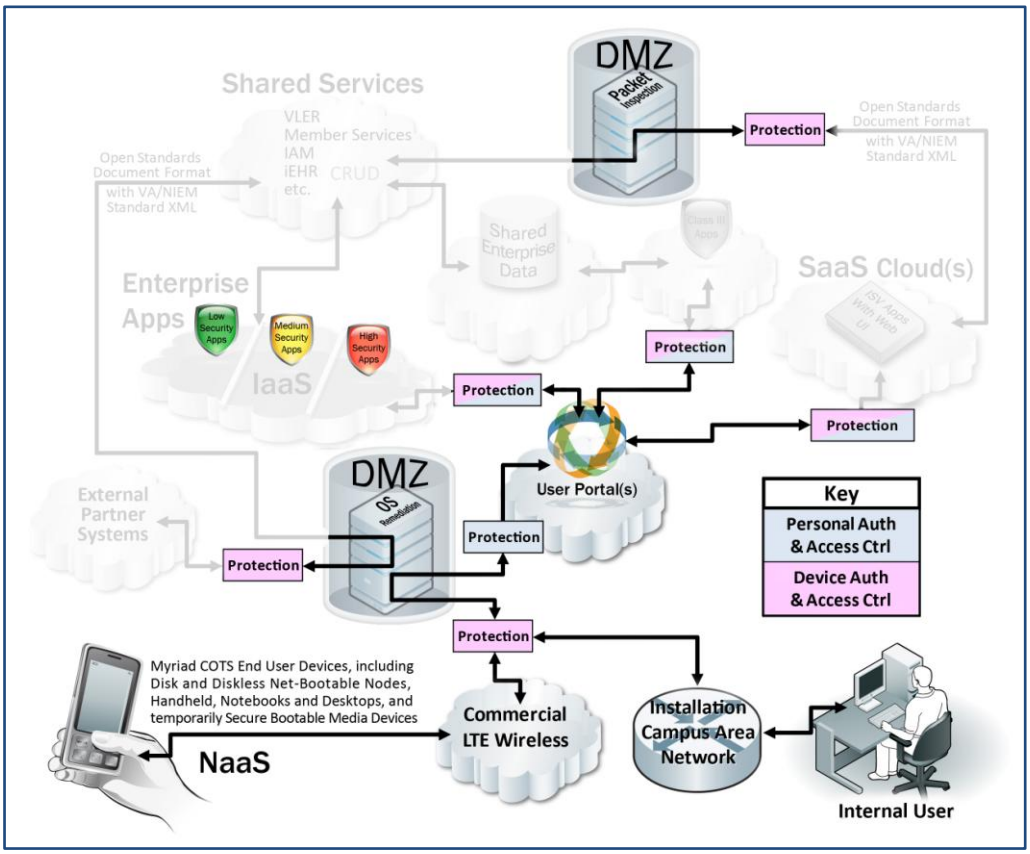
- *All network access servers, application access, devices are managed using single authentication service*
- *Dependence on MS Active Directory for authentication*

Key Points

- *Use separate authentication control for devices and people with no mutual dependency.*
- *It's more practical and important to protect information as it traverses through network than securing the entire network.*
- *Protect Enterprise Applications using Enclaves.*

Future

- *Use TPM mechanism. Trust device based on device itself*
- *Authenticate people using separate service (e.g. PIV)*
- *Applications in enclaves. User roles determine access level.*



The IT Roadmap FY 2013-2020 entries under the category: Security provides more details on the specific technologies and timelines to realize the vision for a Secure Target State. See related Appendix C.

VA's "As Is" security is dependent upon MS Active Directory, and all network access servers, application access, and managed devices use a single authentication service. A device certificate is authenticated by the service, and then individual user credentials are authenticated using the same service. This results in a common layer of protection which is more vulnerable to being compromised. Further, redundant systems are in use for multiple databases, without synchronized enterprise-wide control of levels of access based on "need for

access." The permissions and security systems unecessarily are open to attack. This poses a threat to the Personally Identifiable Information (PII) of our nation's Veterans, VA's computers and other IT equipment, systems, software and networks. Change is needed.

VA's secure target state directly relates to Secure Authentication on separate services, and automated validation of permissions to grant staff access through User Portal(s) to various PII caches necessary to perform their jobs, and to provide Veterans access. It also directlty relates to securing VA's sensitive information, systems, software and networks from breach and intrusion, and providing for data privacy and information security, a more secure way for data to be stored, revised, updated, deleted or transmitted.

To protect VA, employees, and Veterans, two separate authentication controls will provide Authentication Protocol for Devices and Authentication and Access for People. These two controls will have no mutual dependency. The network will make decisions to trust a device based on the device itself. Individual user permissions will be established enterprise-wide to query/validate their authority to access Low/Medium/High Security Applications and grant users access to Enterprise Applications protected in community enclaves using the Infrastructure as a Service (IaaS) cloud.[6]

IaaS will permit users to have access to virtual computers, network-accessible storage, network infrastructure components, and other fundamental computing resources. These security features ensure full PII / Data Protection, and provide enterprise-wide secure, 'one source of truth' for data.

Adoption of IaaS will significantly reduce maintenance of disparate, redundant systems and networks, decrease sustainment costs, and provide for smart, secure and affordable appplications and devices. It also will provide for Veterans to have access to 'one source of truth' and query only one database for all their records. Through the use of a failover protocol, measures will be in place to provide continued availability of information to Veterans and VA staff, and partners, even though a catastrophic event may have occurred at the main database location.

[6] Ibid.

3.1.3 Applications and Data Attributes

Applications & Data Vision Attributes	
7	*Browser Independent Applications*
8	*Reusable Shared Services*
9	*Best of Breed Applications / SaaS*
10	*Persistent Data*

Present

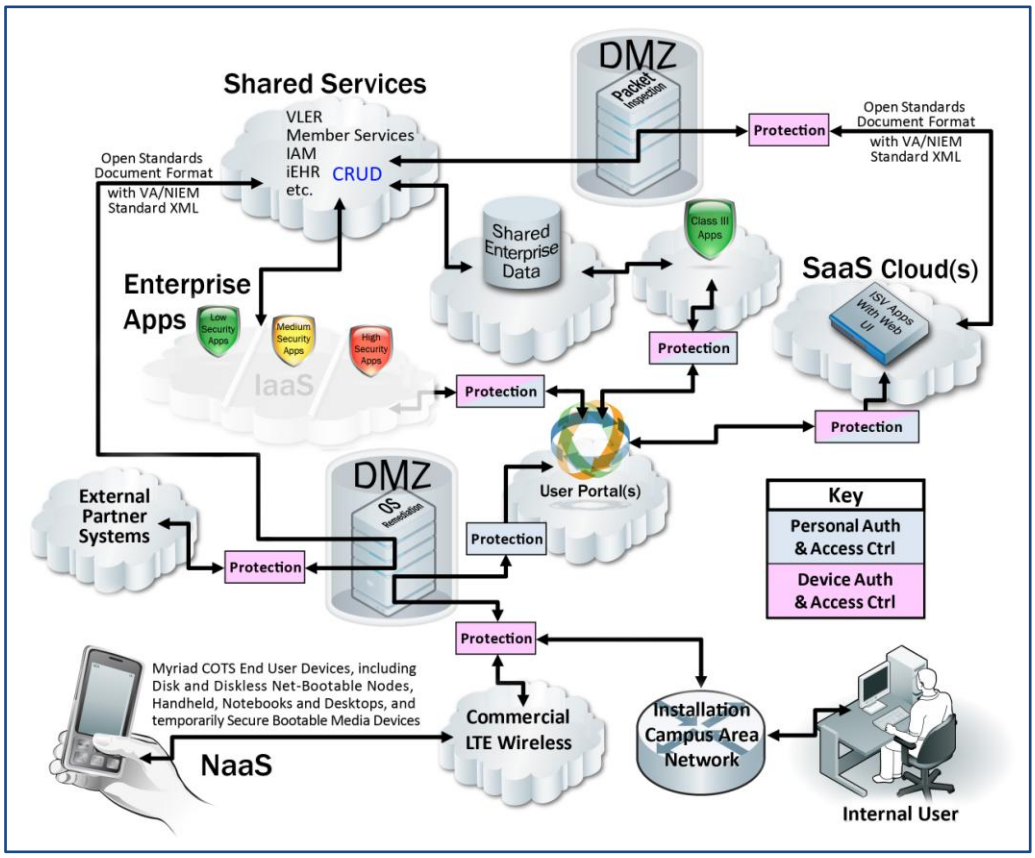
- *In-house developed apps.*
- *Limited use of shared services*
- *No single "source of truth"*
- *Limited use of Open Standards*
- *External partner systems use point-to-point exchanges*

Key Points

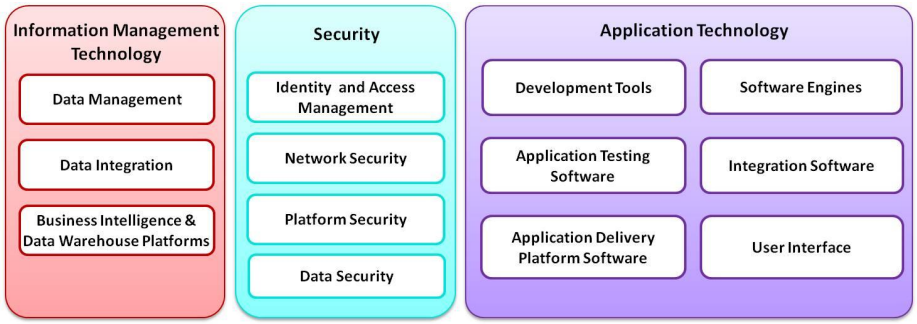
- *All apps are dynamic websites able to be seen from any device.*
- *One "source of truth" ccess via designated CRUD services.*
- *Use Shared Services for data exchange*
- *Leverage COTS, GOTS, SaaS*

Future

- *Apps seen from any device*
- *Commodity cost model*
- *SaaS*
- *VA and External Partners use Shared Services*
- *Single "source of truth"*



The IT Roadmap FY 2013-2020 entries under the categories: Application Technology, Information Management Technology, and Security provide more details on the specific technologies and timelines to realize the vision related to Applications and Data. See related Appendix C.



Presently, VA uses in-house developed applications, and is limited in its use of shared services. Because the architecture is closed and often proprietary, there is limited use of Open Standards. External partners of VA use systems utilizing point-to-point methods to exchange data. Data sources are multiple and varied, and there often is no authoritative, single ' source of truth.'[7] This results in inaccurate data and misleading reports, accidental releases of Personally Identifiable Information (PII) and forces Veterans to provide VA the same information multiple times. Additionally, redundant systems incur extra costs to maintain the duplicative systems.

The future state for Applications and Data includes all applications that are dynamic and able to be accessed and seen from any device, so long as the device is configured to standards established by VA. Further, to harmonize and establish 'one source of truth' for all data, a Create, Read, Update, Delete (CRUD) shared service will be used, along with other shared services for data exchange. External partner systems will be expected to use designated shared CRUD services to access data. The data used by Veterans Health Administration (VHA) will be the same data available to Veterans Benefits Administration (VBA), National Cemetaries Administration (NCA), or VA corporate. Analysis will be dependent upon using metatags and parameters which universally are stored and harmonized in one common data dictionary.

VA no longer will default to developing applications or programs unique to VA, but rather will leverage Best of Breed Applications (i.e., COTS, GOTS) and cloud computing using commercial Software as a Service (SaaS), Infrastructure as a Service (IaaS), and Platform as a Service (PaaS), among others, to reduce costs, decrease redundancy, and enhance interoperability with external partner systems. The use of COTS SaaS is recognition that many Best of Breed Applications will provide VA with the most appropriate solutions.

VA has and will continue to embrace applications and programs that take advantage of an open source model which invites innovation from the public and private sectors. [8]

Future Application User Interfaces (UIs) will all be Browser Independent Dynamic Websites. Users will not be limited to use of one specific browser to exchange data among programs from different vendors. SaaS, provides users with access to software applications which configure applications to end users, and allocate cost for the service based on actual usage. Each of these results in less maintenance, less redunancy, reduced risk, streamlined processes and reduced overall cost in the long-term.

[7] Single source of truth: Data will be available enterprise-wide through a single harmonized database with a view to minimize the proliferation of multiple databases containing similar data.
[8] U. S. Department of Veterans Affairs, *VA Launches Open Source Custodian*, August 30, 2011, http://www.va.gov/opa/pressrel/pressrelease.cfm?id=2153

3.1.4 Flexible, Innovative Infrastructure of the Future

Infrastructure Vision Attributes	
11	*Utility Computing*
12	*On Demand Capacity*

Present

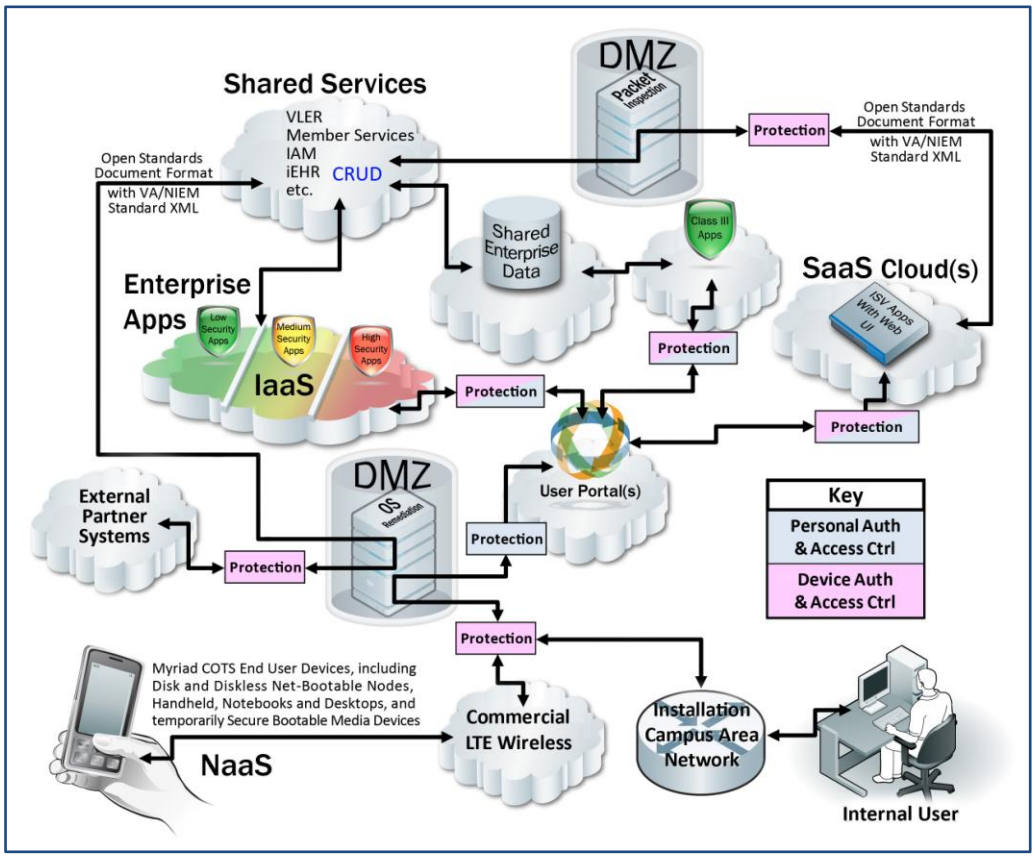
- *VA owned and managed infrastructure*
- *Limited scalability, agility*
- *Strict configuration management*
- *CapEx cost model.*

Key Points

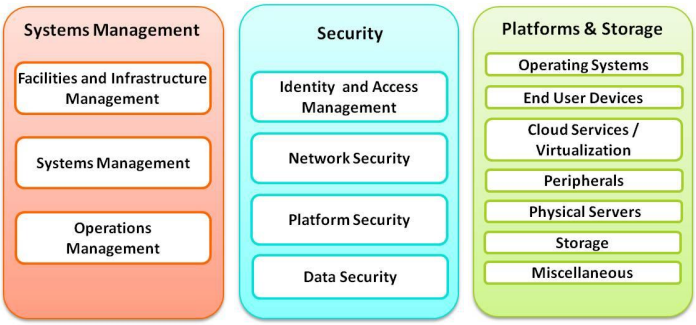
- *Virtualized environments*
- *Change in mindset – don't need to own network and devices but protect information as it traverses through.*
- *Change in how we buy, install and manage the network, platforms, and storage*

Future

- *IaaS*
- *Virtualized environments*
- *Utility cost model*
- *Physically spread environments for redundancy*
- *Scalable and agile but robust and secure*
- *Application enclaves in IaaS*



The IT Roadmap FY 2013-2020 entries under the categories: Platforms and Storage, Systems Management, and Security provide more details on the specific technologies and timelines to realize the vision for a Flexible, Innovative Infrastructure. See related Appendix C.



VA owns its infrastructure which is bound by strict configuration management and associated costs. In order to move toward a flexible, innovative infrastructue of the future, a change in mindset is necessary. VA's data center consolidation efforts are a step in the right direction. VA does not need to own the network and devices, but rather spur innovation across the enterprise, and improve the quality of services for Veterans by seizing the opportunity to manage the costs and systems associated with utility computing and on-demand capacity capabilities.

Utility computing and on-demand capacity, which provide for virtual environments, elasticity, and scalability, are key elements of Infrastructure attributes. In this ontology[9] VA as an enterprise centralizes its computing resources to serve a larger number of users without unnecessary redundancy, and makes computing resources and infrastructure management available as needed. Embracing Infrastructure as a Service (IaaS) will provide users with access to virtual computers, network-accessible storage, network infrastructure components, and other basic IT resources which may be used to deploy and run software.

IaaS provides users with capabilities to access computing resources, and consume only according to the amount or duration of resources they need (CPU hours used by virtual computers, volume and duration of stored data, bandwidth used, or number of IP addresses accessed and used during specific time periods). VA will be charged for actual use, on a fluctuating need basis. This provides for economies of scale, elasticity of service along the spectrum of demand, and allows for greater responsiveness to demand fluctuations. VA pays for what it uses, not for capacity not required at the time which is not being used. It takes into consideration over-subscription of capacity to cover surge.

As VA uses modern tools and technologies, it can change how it serves both its internal and external customers, while better serving our Veterans. [10]

[9] Ontology in Enterprise Architecture is the formal, explicit specification of a shared conceptualization. It formally represents knowledge as a set of concepts within a domain, and the relationship between pairs of concepts. It can be used to model a domain and support reasoning about entities, providing the model for the definitions of objects and/or concepts and their properties and relations.

[10] U.S. General Services Administration: The Cloud First policy mandates that agencies take full advantage of cloud computing benefits to maximize capacity utilization, improve IT flexibility and responsiveness, and minimize cost. . . .Agencies will realize cost savings quicker through increased efficiency, agility, and innovation, and will require less time to close data centers. http://www.gsa.gov/portal/content/190333

4 Next Steps

This vision for VA's IT target state describes an environment that takes advantage of a variety of new and emerging technologies which, when combined, constitutes a dramatic shift in the way capabilities and services are acquired and provisioned; applications are designed and implemented; information is accessed, exchanged, processed, and retained; and important data and the IT infrastructure are protected. Of equal importance to the target state, is the change in mindset required to realize this vision.

4.1 Implementing the Vision

While some OIT programs have begun implementing technologies aligned with this vision, particularly in the areas of the "To Be" Workplace and Shared Services, transitioning to realize the vision will be done incrementally. The IT Roadmap FY 2013-2020 is the first step in defining technologies and timelines that will guide OIT along the way. In addition, a variety of policies and architecture products also are being aligned with this vision:

- **VA IT Strategic Plan** - Supports the OneVA EA model and VA Strategic Plan Refresh 2011-2015 will be a new requirement to align with and support the strategic direction of VA as defined in VA's Strategic Plan. VA's IT Strategic Plan clearly will articulate the vision, goals and objectives tailored to support VA's IT needs and its specific mission, as well as identify strategies and associated action plans and performance indicators.
- **Enterprise Target Application Architecture** (ETAA) – ETAA provides guidance and direction to VA system designers and developers as to how VA application systems will be designed and built to facilitate delivery of services to Veterans, and support IT portfolio management, capital planning, and investment control. [11]
- **Release Architecture** (RA) **-** Outlines the current operating environment at VA Data Centers and provides specifications that should be used for any new, enhanced or plan replacement IT systems. Development teams use this reference to understand target platforms which they will develop and implement. This architecture also should include details on enterprise services (e.g. identity management, search and discovery) that are identified, provisioned. required or mandated for use in all enterprise solutions and or applications.[12]
- **Technical Reference Model** (TRM) **–** Provides a framework to describe how IT standards and technologies support the secure delivery, exchange, and construction of reusable Components and Capabilities. Aligning agency capital investments to the TRM leverages a common, standardized vocabulary, allowing interagency discovery, collaboration, and interoperability.

[11] Retrieved from OneVA EA Enterprise Technical Architecture intranet site http://vaww.ea.oit.va.gov/OneVA/TechnicalArchitecture.asp

[12] Thrower, W. Lloyd, VA Briefing, Release Architecture, Washington, D. C., December 1, 2011.

- **Office of Information Security** (OIS) **Information Security Architecture –** Outlines the rules and standards governing Information Protection Governance, Data Security and Privacy Services, Mission Area Information Assurance, and Interconnecting Operations and Services.

4.2 Managing the Vision

The Governance and Management Process, and Rules and Standards to be used in the future, include how the IT Roadmap will be maintained and updated. The Governance process and Rules and Standards are addressed in separate documents. Additional information may be found at http://vaww.ea.oit.va.gov/OneVA/GovStrat.asp.

Charters of existing governing bodies will be reviewed to ensure they are complementary, integrated, aligned, and consistent. Decision-making and advisory roles and responsibilities also will be reviewed. Responsible parties and mechanisms to ensure the IT Roadmap is being properly used will be identified. Innovation technology scanning activities will be aligned with those undertaken by the Architecture and Engineering Review Board (AERB).

4.3 Sustaining the Vision

To sustain the vision, it is important to provide a timeline with milestones to show various components, such as the Strategic Planning Process, Multi-Year Planning (MYP), and VA Quadrennial Strategic Planning Process (QSPP), and their impact upon the IT Roadmap. Likewise, the graphical representation of VA's IT Vision for the IT Roadmap Refresh Schedule provides the starting or "As Is" baseline, and the "To Be" vision for the future, with quarterly milestones across the timeline of 2012 – 2015[13]. This aligns with the VA Strategic Plan Refresh 2012-2015. The fully populated IT Roadmap will track through FY 2020.

5 Conclusion

This technology vision is ambitious but achievable through conscientious effort to ensure that all technology investments from this point forward are aligned with this vision and underlying architecture. To reap immediate benefits, OIT must strive to realize this vision as quickly and as economically feasible. This technology vision is not so much about creating a "world class" IT environment as it is about enabling VA to deliver "world class" medical care, benefits, social support, and lasting memorials promoting the health, welfare, and dignity of all Veterans in recognition of their service to this Nation.

6 Summary of Appendices

Appendix A consists of a list of acronyms and corresponding definitions used within this document.

[13] Tibbits, Dr. Paul, Director, Architecture, Strategy and Design, OIT, Department of Veterans Affairs, SES Retreat Briefing, July 2012.

Appendix B is a brief collection of global principles, policies, rules and standards which must be adhered to in order for VA to be able to seamlessly exchange and use information, as well as develop and deliver services and capabilities to serve Veteran's needs.

Appendix C is an expansion of seven technology categories which describe VA's current baseline computing environment necessary to provide support and infrastructure to meet VA's IT needs through FY 2020. The Technology Category Framework (Tier 1 and Tier 2) is graphically displayed in Figure 2 contained in this document, and is extracted from the Technical Reference Model (TRM) tool used by VA. The sub-segments found in Tier 2, are decomposed into Near-Term Vision (2013-2015) and Long-Term Vision (2013-2017). Long-Term vision is narrowly stated as 2015-2017; however, in the IT Roadmap output dated June 1, 2012 and the SES Retreat presentation (July 2012), there are instances which run across all time spectrums, ending in Long-Term. To be inclusive, the Long-Term time-frame is stated as 2013-2017. Where known, specific Long-Term time-frames are parenthetically stated within the technology description. The seven technology categories include:

1. Collaboration and Electronic Workplace,
2. Network and Telecommunications,
3. Security,
4. Information Management Technology,
5. Application Technology,
6. Systems Management, and
7. Platforms and Storage.

Data captured in this Appendix was obtained from the IT Roadmap output dated June 1, 2012, and the SES Retreat presentation made in July 2012. Instances where there are Tier 3 technology categories, but no data, are labeled "Yet to be determined." There are instances of new Tier 3 technology categories, previously not captured in the IT Roadmap output, or the SES Retreat presentation, identified as "New Category as of TRM August 2012." The information presented presumes the reader has prior knowledge of the technical aspects of the technologies, which are specific to their area of interest, and will be useful to them in their planning efforts.

For additional information please refer to: http://vaww.ea.oit.va.gov

Appendix D lists sources that provide more detailed information and insight on the topics and concepts discussed within this document.

APPENDIX A - Acronyms

Acronym	*Definition*
AERB	Architecture and Engineering Review Board
ASD	Architecture, Strategy, and Design
BIRB	Business Intake Review Board
BNTIB	Budgeting and Near-Term Investment Board
BOP	Business Operating Plan
CIO	Chief Information Officer
COTS	Commercial Off The Shelf
DBMS	Database Management System
DGC	Data Governance Council
DMZ	Demilitarized Zone
EA	Enterprise Architecture
EAC	Enterprise Architecture Council
ESB	Enterprise Service Bus
ETA	Enterprise Technical Architecture
ETAA	Enterprise Target Application Architecture
ETL	Extract Transform Load
ETP	Enterprise Transition Plan
GIS	Geographic Information System
GOTS	Government Off The Shelf
HTML	Hyper Text Markup Language
IAM	Identity and Access Management
IAAS	Infrastructure As A Service
IMT	Information Management Technology
IPSOSaaS	Infrastructure, Processing, Storage, and OS as a Service
IP	Internet Protocol
ISC	Integrated Steering Committee
ITDS	Innovative Technologies and Discovery Strategies
ITLB	IT Leadership Board

Acronym	*Definition*
ITRM	IT Resource Management
ITWD	IT Workforce Development
LAN	Local Area Network
M2M	Machine-to-Machine Communications Services
MPR	Management Performance Report
MS	Microsoft
MYP	Multi-Year Planning
NaaS	Network As A Service
NCA	National Cemetery Administration
NIST	National Institute of Standards and Technology
OCIO	Office of the Chief Information Officer
OEA	Office of Enterprise Architect
OIS	Office of Information Security
OIT	Office of Information and Technology
OPP	Office of Policy and Planning
OSEHRA	Open Source Electronic Health Record Agent
PaaS	Platform As A Service
PD	Product Development
PII	Personally Identifiable Information
PLTIB	Planning and Long-Term Issues Board
PMAS	Program Management Accountability System
POC	Point of Care / Point of Contact
PWS	Project Work Statements
QoS	Quality of Service
QSPP	Quadrennial Strategic Planning Process
RA	Release Architecture
RAP	Rigor and Performance Report
RIA	Rich Internet Application
SaaS	Software As A Service

Acronym	*Definition*
SDE	Service Delivery and Engineering
SES	Senior Executive Service
SLA	Service-Level Agreement
SOA	Service Oriented Architecture
SRG	Senior Review Group
SMC	Strategic Management Council
SQA	Software Quality Assurance
TRM	Technical Reference Model
TWG	Technical Work Group
UAT	User Acceptance Testing
UI	User Interface
VA	United States Department of Veterans Affairs
VAEB	VA Executive Board
VAMC	Veterans Affairs Medical Center
VBA	Veterans Benefits Administration
VHA	Veterans Health Administration
VLER	Veteran Life-Time Electronic Record
WAN	Wide Area Network

Note: This list of Acronyms does not include the technical requirements listed within the technology components in Appendix C.

APPENDIX B – Policies and Architecture Products, Rules and Standards for ETA

Over the past year, VA's OIT has published a variety of policies and architecture products to document rules and standards for the ETA. These documents may be found on the OneVA EA intranet site (http://vaww.ea.oit.va.gov) along with other OneVA EA products. (See, VA Enterprise Target Application Architecture v0.3.1, April 2012, Office of Product Development (PD))

Collectively, these principles, rules and standards seek to ensure interoperability of VA's IT environment, and integration of new applications which will seamlessly serve Veterans needs, while operating safely and effectively.

1. VA SOA Technical Framework v0.3.1, April 2012, Office of Product Development (PD)

2. VA SOA Layer Implementation Guide v0.1, January 2012, Office of Product Development (PD)

3. OIT Release Architecture V1.21, November 30, 2011, Service Delivery and Engineering(SDE)

4. Certification and Accreditation of VA Information Systems, VA Handbook 6500.3, November 24, 2008

5. VA Technical Reference Model (TRM), Office of Architecture, Strategy & Design (ASD)

6. The Department of Veterans Affairs Enterprise Architecture Vision and Strategy Document (OneVA EA), Office of Architecture, Strategy & Design (ASD)

Latest versions of the referenced documents are available at:
http://vaww.ea.oit.va.gov/OneVA/TechnicalArchitecture.asp

APPENDIX C –Technology Components of IT Roadmap

The IT Roadmap is multi-faceted. It serves as a guide to future IT investment decisions regarding IT services, processes, applications, systems, technologies, resources, security, risk, and timelines necessary to meet VA'S IT strategic goals and objectives.

VA's IT Roadmap focuses on seven technology categories which describe VA's current baseline computing environment, and illustrate VA's plans for providing support of its IT needs through FY 2020. The Technology Category Framework (Tier 1 and Tier 2) is graphically displayed in Figure 2 contained in this document, and is extracted from the Technical Reference Model (TRM) tool used by VA. The sub-segments found in Tier 2, are decomposed into Near-Term Vision (2013-2015) and Long-Term Vision (2013-2017). Long-Term vision is narrowly stated as 2015-2017; however, in the IT Roadmap output dated June 1, 2012 and the SES Retreat presentation (July 2012), there are instances which run across all time spectrums, ending in Long-Term. To be inclusive, the Long-Term time-frame is stated as 2013-2017. Where known, specific Long-Term time-frames are parenthetically stated within the technology description. The seven technology categories include:

1. Collaboration and Electronic Workplace,
2. Network and Telecommunications,
3. Security,
4. Information Management Technology,
5. Application Technology,
6. Systems Management, and
7. Platforms and Storage.

Data captured in this Appendix was obtained from the IT Roadmap output dated June 1, 2012, and the SES Retreat presentation made in July 2012. Instances where there are Tier 3 technology categories, but no data, are labeled "Yet to be determined." There are instances of new Tier 3 technology categories, previously not captured in the IT Roadmap output, or the SES Retreat presentation, identified as "New Category as of TRM August 2012." The information presented presumes the reader has prior knowledge of the technical aspects of the technologies, which are specific to their area of interest, and will be useful to them in their planning efforts. In order to maintain alignment of technologies with the IT Vision, this section may be updated to identify new or emerging technologies.

For additional information please refer to: http://vaww.ea.oit.va.gov

1 Collaboration and Electronic Workplace

Collaboration and Electronic Workplace – Desktop applications to promote sharing and collaborative work, and to facilitate productivity. Comprehensive end user device support will provide Veterans, VA employees and contractors with device freedom. Adopting A Bring Your Own Device (BOYD) policy supports the goal of cost effective access to all information on any device within 5 years.

Collaboration and Electronic Workplace supports the OneVA ETA sub-segment: IT Services and Capabilities and includes the technologies listed in the diagram.

Benefits: Collaboration and productivity tools will leverage open source standards and technologies, social media, mobile platforms, and improved visualization tools to increase personal and team productivity.

Additional information regarding Tiers 1, Tier 2, and Tier 3 of the TRM may be found at: http://trm.oit.va.gov/.

Productivity Software – Standards and Software applications that support users' personal productivity including office suites, multimedia graphics and design suites, web page authoring packages, publishing packages and file viewers.

➢ Near-Term Vision (2013-2015) - Productivity Software	
Accounting & Finance	In-House Solution. Initial migration to the Cloud.
Desktop Publishing	Commercial Off the Shelf (COTS) Initial migration to the Cloud.
File Manager & Viewer	COTS. Initial migration to the Cloud.
Graphics Design Software	COTS. Initial migration to the Cloud.
Health Care	In-house solution. Reengineer / Make / Buy.
Multimedia Software	COTS. Initial migration to the Cloud.
Standard Office Suite	COTS. Initial migration to the Cloud.
Miscellane-ous Productivity	COTS. Initial migration to the Cloud.

➢ Near-Term Vision (2013-2015) - Productivity Software	
Tools & Utilities	
Web Browser	COTS. Initial migration to the Cloud.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 4-5). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - Productivity Software	
Accounting & Finance	Initial migration to the Cloud.
Desktop Publishing	Initial migration to the Cloud.
File Manager & Viewer	Initial migration to the Cloud.
Graphics Design Software	Initial migration to the Cloud.
Health Care	Initial migration to the Cloud.
Multimedia Software	Initial migration to the Cloud.
Standard Office Suite	Initial migration to the Cloud.
Miscellane-ous Productivity Tools & Utilities	Initial migration to the Cloud.
Web Browser	Initial migration to the Cloud.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 4-5). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

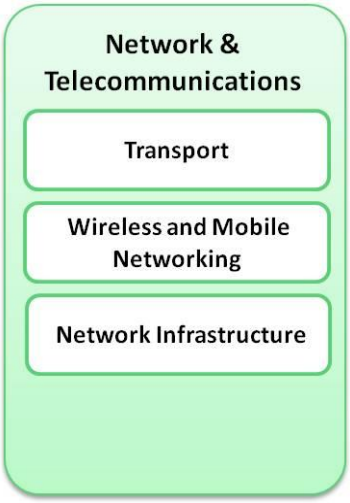
Collaboration Software – Standards and Software applications that support group productivity and interaction between participants such as email, content management, file sharing, instant messaging, and team collaboration environments.

➢ Near-Term Vision (2013-2015) - Collaboration Software

➢ Near-Term Vision (2013-2015) - Collaboration Software	
Content Management	Continue utilizing SharePoint
Electronic (Instant) Messaging	COTS. Initial migration to the Cloud.
Unified Messaging	The combination of Electronic Instant Messaging and E-mail and Calendaring into one service. When Unified Messaging is deployed, the other technologies should go away.
Email and Calendaring	Multiple corporate solutions (Outlook & VistA). Email as a Service (Enhanced email search, Archival and Retrieval services).
Real Time & Team Collaboration	Multiple COTS solutions. SaaS (e.g., SharePoint). Time & Team Collaboration are limited to a core set of COTS solutions.
Shared Whiteboard	Initial migration to the Cloud.
Process Schedule & Synchroniza-tion	COTS. Initial migration to the Cloud.
Computer-based Training – CBT	COTS. Initial migration to the Cloud.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - Collaboration Software	
Content Management	To establish organizational policy, guidelines and governance which ensure uniform, organized creation and maintenance of organizational content of all types, improved and standardized utilities for storing, organizing, searching and archiving data; and enhanced methodology to manage user access to organizational content..
Electronic (Instant) Messaging	Initial migration to the Cloud.
Unified Messaging	Initial migration to the Cloud.
E-Mail and Calendaring	Email as a Service (Enhanced email search, Archival and Retrieval services).
Real Time & Team Collaboration	Software as a Service (e.g., SharePoint). Policy and guidance are implemented to ensure artifacts and information originating in collaborative utilities is managed adequately as corporate content assets, including organization, access, discoverability, and archiving, etc.
Shared Whiteboard	Initial migration to the Cloud.
Process & Schedule Synchronization Tools	Initial migration to the Cloud.
Computer Based Training (CBT)	Initial migration to the Cloud.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 4-5). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

2 Network and Telecommunications



Network and Telecommunications – This category includes all standards, software, and hardware for computer networking and telecommunications.

Network and Telecommunications supports the OneVA ETA sub-segment: IT Services and Capabilities and includes the technologies listed in the diagram.

Benefits: Technologies in the Network and Telecommunications domain will provide Veterans, VA employees and contractors with access to VA information and services from any location, through any device, at any time.

Additional information regarding Tiers 1, Tier 2, and Tier 3 of the TRM may be found at: http://trm.oit.va.gov/.

Transport - Includes those technology elements that provide base level permanent or intermittent connectivity.

➢ Near-Term Vision (2013-2015) - Transport	
Local / Campus Area Network (LAN/CAN)	CAT5 (Divest), CAT6 (Sustain), Fiber (Buy); 802.11 (Sustain); Implement VLAN _ DoS (Buy) (2013). CAT6 (Divest), Fiber (Buy), LTE (Buy), 802.11 (Divest), VLAN + DoS (Buy) (2014-2015)
Wide Area Network (WAN)	Private dedicated Circuits. End user Remote Access VPN, Network Administration Remote Access, Application Administration Remote Access, Installation Level (2013). WWW (Buy), SSL Over HTTP, No network administration remote access, VPN with 2Factor Authentication, Clustered PoPs/Enterprise DMZs (Buy) (2014-2015).
Telecommuni-cations	IPv4 (Divest), PSTN – TDM (Divest), VoIP (Sustain) (2013). Unified Communications (2014-2015).
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 9-11). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) Transport	
Local/Campus Area Network (LAN/CAN)	Within the next several years, for VA's Local/Campus Area Network CAT6 (Divest), Fiber (Buy), LTE (Buy), 802.11[*] (Divest) and VLAN + QoS (Buy). After purchase, sustainment will be needed for Fiber (Sustain), LTE (Sustain), and VLAN + QoS (Sustain).
Wide Area Network (WAN)	Yet to be determined.
Telecommuni-cations	Unified Communications (Everything over IP), IP v6 (Buy).
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 9-11). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Wireless and Mobile Network – Networks which use the electromagnetic spectrum as a medium of communication.

➢ Near-Term Vision (2013-2015) – Wireless and Mobile Network	
Wireless Networks	Yet to be determined.
Cellular Networks	Yet to be determined.
Short Range Wireless	Yet to be determined.
Radio and Satellite	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 9-11). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) – Wireless and Mobile Network	
Wireless Networks	Yet to be determined
Cellular Networks	Yet to be determined.
Short Range Wireless	Yet to be determined.
Radio and Satellite	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 9-11). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Network Infrastructure - Hardware devices and their associated software which redirect network connections to manage the performance of applications are contained in this group. Connection requests, and subsequent network traffic, is redirected to appropriate servers on the basis of a defined algorithm. The algorithm can be as simple as round robin or as complex as based on an evaluation of the current workload of the participating servers. Content switches, also known as layer three switches, have the ability to inspect the content of the network traffic and determine where to redirect the traffic.

➢ Near-Term Vision (2013-2015) - Network Infrastructure	
Switching and Routing	Multiple COTS solutions. Standards based consolidated solutions
Load Balancing and Failover	Multiple COTS solutions. Standards based consolidated solutions. Global Failover between Data Centers (Active-Active).
Network Name and Address	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 9-11). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - Network Infrastructure	
Switching and Routing	Standards based consolidated solutions
Load Balancing and Failover	Standards based consolidated solutions, Global Failover between Data centers (Active-Active).
Network Name & Address	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 9-11). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

3 Security

Security includes standards and software to support information security (protecting data), computer security (protecting systems), and information assurance (people, products, and procedures to ensure data confidentiality, integrity, availability, assured delivery, and non-repudiation)

Security technology supports the OneVA ETA sub-segment: IT Services and Capabilities and includes the technologies listed in the diagram.

Benefits: The personal/device authentication/access control and the DMZ components will enable secure, seamless methods for authenticating user and devices as well as the full protection of personal and sensitive information.

Additional information regarding Tiers 1, Tier 2, and Tier 3 of the TRM may be found at: http://trm.oit.va.gov/.

Identity and Access Management (IAM) - IAM software, appliances, and services are used to create and manage user identities, provide authentication, and to permit users access to system resources based on predefined criteria. Also known as Authentication, Authorization, and Access (AAA),which includes standards and software for password management, self-service reset, user provisioning, user administration, external access management, enterprise access management, and authentication systems including enterprise digital rights management, federated identity systems, and directories.

➢ Near-Term Vision (2013-2015) - Identity and Access Management	
Identity Management – People (Internal)	Consolidate Identity Store.
Identity Management – People (External)	Consolidate Identity Store and Use VA IAM Service for Identity Provisioning.
Identity Management – Devices (Internal)	Consolidate Identity Store.
Identity Management – Devices (External)	Consolidate Identity Store.

➢ Near-Term Vision (2013-2015) - Identity and Access Management	
Authentication –People (Internal)	SSO (Secure), Biometrics (PKI) (Buy), User ID + Password (Sustain/Enhance), SPNEGO / Kerberos (Sustain) (2014-2015).
Authentication – People (External)	AD (SID) (User ID + Password) (2013), Federation ADFC (Commercial Service Provider) (Standards Based) (2014-2015)
Authentication Devices (Internal)	PKI on TPM via Ad, 802.1x, MacID (2014-2015)
Authentication Devices (External)	Commercial Service Provider, Standards Based, OMB/GSA/Federal Solution.
Authorization People (Internal)	Application Enclaves, Application - Enterprise ABAC/RBAC Svc provided by IAM, Network --> Active Directory (Not y IAM).
Authorization People (External)	Application --> Enterprise ABAC/RBAC Service provided by IAM, Third Party Service Providers – Standards Based (FDS/SAML) DoD --> ??
Authorization Devices (Internal)	Network --> AD (SID) Network --> OS Checking Remediation, Applications --> Move to Enclave (2014 – 2015).
Authorization Devices (External)	Network --> AD (SID) Network --> OS Checking Remediation, Applications --> Move to Enclave (2014 – 2015).
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 29-32). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - Identity and Access Management	
Identity Management – People (Internal	Yet to be determined.
Identity Management – People (External	Yet to be determined.
Identity Management – Devices (Internal)	Yet to be determined.
Identity Management-Devices (External)	Yet to be determined.
Authentica-tion – People (Internal)	User IDs + Password (Divest) Biometrics and Smartcards (PIV/PKI)(Buy). SPNEGO / Kerberos (Sustain).
Authentica-tion – People (External)	Yet to be determined.
Authentica-tion – Devices (Internal)	Devices (Internal) are PKI on TPM via AD and 802.1x, MacID (2014-2015); PKI on TPM or SIM (2016-2017). 802.lx,MacID.
Authentica-tion – Devices (External)	Move towards a Commercial Service Provider, Standards Based, OMB/GSA/Federal Solution.
Authorization – People (Internal)	Move toward Application Enclaves.
Authorization – People (External)	Yet to be determined.
Authorization – Devices (Internal)	Network --> PKI on TPM/SIM, Enclave --> PKI on TPM/SIM, Applications --> Enclave Based.
Authorization – Devices (External)	Network --> PKI on TPM/SIM, Enclave --> PKI on TPM/SIM, Applications --> Enclave Based.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 29-32). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Network Security - Standards, provisions and policies adopted to prevent and monitor unauthorized access, misuse, modification, or denial of a computer network and network-accessible resources and the protection of data in transit such as PII and HIPAA info.

➢ Near-Term Vision (2013-2015) - Network Security	
Antivirus and Antimalware	Advanced Malware Detection (ATP),FireEye, Damballa and OTC, Anomaly Detection, and Browser Protection..
Content Filtering	Create a Black List. There will be no Email Content Filtering. VA will focus on User activity auditing, first set thresholds then move toward BI analytics.
Encryption	Adopt Cloud Encryption Data in motion and Data at Rest.
Security Administra-tion	Yet to be determined. Currently being vetted.
Security Event & Information Management	Move toward Consolidated Solutions and establish Knowledge Management.
Vulnerability Management	Keep pace with Platforms, Device/Network Scanning (Agent/Agentless)
Network Auditing	Acquire actionable Intel (Business Intelligence of Audit info)
Network Intrusion Detection and Prevention	Anomaly and APT.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 29-32). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - Network Security	
Antivirus and Antimalware	Yet to be determined.
Content Filtering	Yet to be determined.
Encryption	Yet to be determined.
Security Administra-tion	Yet to be determined.
Security Event &	Yet to be determined.

➢ Long-Term Vision (2013-2017) - Network Security	
Information Management	
Vulnerability Management	Automation --> Feed into Knowledge Management.
Network Auditing	Yet to be determined.
Network Intrusion Detection and Prevention	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 29-32). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Platform Security - Standards and software for protection of computing resources from malicious logic infection and exploitation.

➢ Near-Term Vision (2013-2015) - Platform Security	
Secure OS Boot	Implement Secure Boot USB (2014-2015), and a Persistent/Non-Persist OS, as well as OS Remediation
Application Security	Obtain comprehensive end-to-end with layered security and Application code vulnerability scanning(2013 – 2014).
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 29-32). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - Platform Security	
Secure OS Boot	Implement Secure PXE Boot (Next Generation), and OS Remediation.
Application Security	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 29-32). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Data Security - Standards and software for the protection of data at rest, for processing and storing PII and HIPAA information, impeding unauthorized exportation of data from the enterprise.

➢ Near-Term Vision (2013-2015) - Data Security	
Data Loss Prevention	Move toward Content Aware DLP.

➢ Near-Term Vision (2013-2015) - Data Security	
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 29-32). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - Data Security	
Data Loss Prevention	Move toward Content Aware DLP.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 29-32). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

4 Information Management Technology

Information Management Technology includes standards and software for the organized storage, retrieval, management, and analysis of a collection of data.

Information Management Technology supports the OneVA ETA sub-segment: IT Services and Capabilities and includes the technologies listed in the diagram.

Benefits: Data mining, business intelligence, and analytics technologies, applied to federated database systems and data warehouses, will help the VA discover patterns, make predictions, and deliver improved outcomes for Veterans.

Additional information regarding Tiers 1, Tier 2, and Tier 3 of the TRM may be found at: http://trm.oit.va.gov/.

Data Management - Includes different types of database management systems and related technologies**.**

➢ Near-Term Vision (2013-2015) - Data Management	
Database Connectivity	New Category as of TRM August 2012.
Desktop DBMS	Multiple COTS solutions. Desktop DBMS is to be phased out.
Embedded DBMS	Multiple COST Solutions. Move toward consolidation to a minimal set.
Object-Oriented DBMS	Multiple COTS Solutions; Consolidate to minimal set.
Relational DBMS	Adopt Strategic Enterprise Solutions (Oracle, MS SQL). Define role of each solution.
Columnar DBMS	New Category as of TRM August 2012.
Natural Language Processing	Pilot; Introduce Natural Language Processing.
DB-Related Management Tools	Multiple Data Modeling Tools. Conceptual, Logical, Physical and ER Modeling. Consolidate to core Data Modeling Tool(s).
Data Quality Management	Pilot; Standardize.

➢ Near-Term Vision (2013-2015) - Data Management	
Master Data Management	Authoritative Data Sources; Enterprise Taxonomy and Ontology Management; Health, Benefits and Cemetery Domains; Standardize;
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 6-8). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - Data Management	
Database Connectivity	New Category as of TRM August 2012.
Desktop DBMS	Desktop DBMS is to be decommissioned.
Embedded DBMS	Move toward standardization.
Object-Oriented DBMS	Move toward standardization.
Relational DBMS	Yet to be determined.
Columnar DBMS	New Category as of TRM August 2012.
Non-Relational Data	Migrate toward Application agnostic Data Services.
DB-Related Management Tools	Move toward standardization.
Data Quality Management	Yet to be determined.
Master Data Management (MDM)	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 6-8). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Data Integration - Standards and software that facilitate the assured exchange of data between applications and services. In addition, this category significantly overlaps Application Technology—Integration Software.

➢ Near- Term Vision (2013-2015) - Data Integration

➢ Near- Term Vision (2013-2015) - Data Integration	
Database Replication and Clustering	Yet to be determined.
Extract, Transform, Load (ETL)	Combination of COTS and home grown solutions.
Data at Rest	Combination of COTS and home grown solutions.
Data in Motion (Common Message Terminology and Semantics)	No enterprise level data harmonization.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 6-8). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - Data Integration	
Database Replication and Clustering	Distributed Processing of Large Datasets. Meet enterprise level availability and data replication (DR) goals.
Extract, Transform, Load (ETL)	Data storage is abstracted to facilitate re-hosting, application modernization and Cloud hosting alternatives.
Data at Rest	Abstracted to facilitate re-hosting, application modernization and Cloud hosting alternatives.
Data in Motion (Common Message Terminology and Semantics)	Common Information Interoperability Framework (CIIF). Data storage is abstracted to facilitate re-hosting, application modernization and Cloud hosting alternatives.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 6-8). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%2

➢ Long-Term Vision (2013-2017) - Data Integration	
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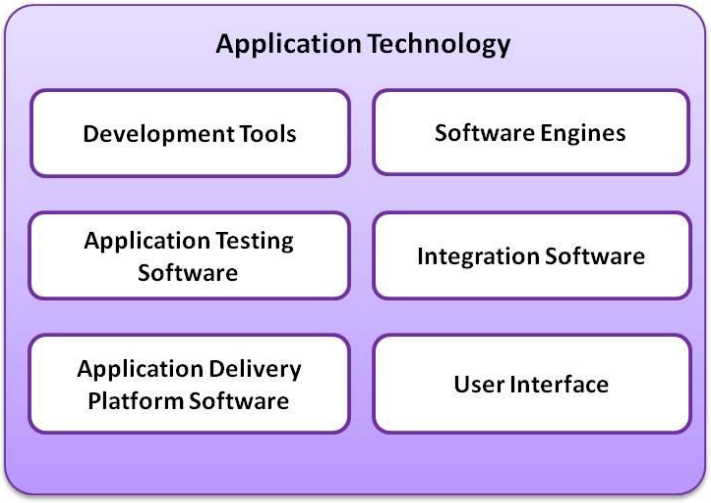
Business Intelligence and Data Warehouse Platforms - Standards and software tools that allow the storage, access and analysis of data in a data warehouse. They include online analytical processing tools (OLAP), data mining tools, executive information systems, data extraction, query and reporting tools, multidimensional tools and decision support systems.

➢ Near-Term Vision (2013-2015) - Business Intelligence & Data Warehouse Platforms	
Business Intelligence Platforms	Yet to be determined.
Data Warehousing Systems	New Category as of TRM August 2012.
Web Reporting Tools	Multiple COTS solutions. Consolidate Tools to Minimal Set.
Dashboard/ Scorecard Tool	Multiple COTS solutions. Consolidate Tools to Minimal Set.
Data Mining Tools	Multiple COTS solutions. Consolidate Tools to Minimal Set.
Geospatial Tools	Multiple COTS solutions. Consolidate Tools to Minimal Set.
Data Analytics (Statistical Analysis, Prediction, and Modeling)	Multiple COTS solutions. Consolidate to core COTS Solution(s).
Point of Care (PoC) Analytical Applications	Implement. Standardize and consolidate to core COTS Solution(s).
Unstructured Data/Natural Language Processing	Automated capability to analyze a problem, generate hypotheses, test possible solutions, and assign a confidence rating in its answer applied to notoriously difficult task of differential diagnosis. Strategic solution adoption for Enterprise usage.
Clinical Environment and Tools	Implement. Expand.

➢ Near-Term Vision (2013-2015) - Business Intelligence & Data Warehouse Platforms	
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 6-8). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - Business Intelligence & Data Warehouse Platforms	
Business Intelligence Platforms	Yet to be determined.
Data Warehousing Systems	New Category as of TRM August 2012.
Web Reporting Tools	Standardize.
Dashboard/ Scorecard Tool	Standardize.
Data Mining Tools	Standardize.
Geospatial Tools	Standardize.
Data Analytics (Statistical Analysis, Prediction, and Modeling)	Image, Audio, and Video Analytics. Healthcare Provider Applications may be an important influence.
PoC Analytical Applications	Yet to be determined.
Unstructured Data/Natural Language Processing	Automated capability to analyze a problem, generate hypotheses, test possible solutions, and assign a confidence rating in its answer applied to the notoriously difficult task of differential diagnosis, and Strategic solution adoption for Enterprise usage.
Clinical Environment and Tools	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 6-8). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

5 Application Technology



Application Technology includes standards and software which (1) relates to the specification, design, construction, implementation and lifecycle management of software applications, or (2) provides application layer communication, presentation, and business logic services.

Application Technology supports the OneVA ETA sub-segment: IT Services and Capabilities and includes the technologies listed in the diagram.

Benefits: Standardized application technologies will enable faster and cheaper development cycles for new systems, faster and easier system deployments and sustainment, and improved reuse of services and data in service oriented architecture.

Additional information regarding Tiers 1, Tier 2, and Tier 3 of the TRM may be found at: http://trm.oit.va.gov/.

Development Tools - Standards and software relating to the requirements gathering, specification, design, and construction of applications

➢ Near-Term Vision (2013-2015) - Development Tools	
Analysis, Design & Modeling	Existing DBMS DD Tools, Enterprise logical (as-is) model, and Standards based (UML, BPMN2.0, SysML, ER) minimal set of strategic tools for enterprise adoption.
Application Development Tools	Evaluate multiple COTS Solutions and establish and define which ones to retain and/or acquire. Build with Standardized, consolidated tool set.
Build and Deployment Tools	Multiple COTS Solutions and Tools. Minimal set of strategic tools for build and deploy.
Defect Tracking	Multiple COTS Solutions and Tools. Single consolidated tool.
Development Framework-	Monolithic Applications (legacy self-contained applications independent from other computing applications, update based on needs/funding). N-Tier Application Framework with Security Framework.

➢ Near-Term Vision (2013-2015) - Development Tools	
User Interface Design Tools	Yet to be determined.
Integrated Development Environment	Minimal set of strategic tools for enterprise adoption (e.g. Eclipse based) and Multiple COTS Solutions & Tools.
Legacy Modernization	Migrate to thin client (HTML5) and web applications; Create services; Establish using approved development framework (Phase out Delphi). Augment VistA with the use of Cache Objects using Cache Server Pages as an efficient means to provide services from the VistA domain.
Process Management Tools	Enhanced and expanded ProPath.
Requirements Management	Rational Toolset Augment tools with support for Agile development methodology
Software Change and Configuration Management	Multiple COTS and minimal set of strategic tools for enterprise adoption (Rational Set). Support Open Source development (OSEHRA)
Web Authoring Tools	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - Development Tools	
Analysis Design & Modeling	Standards based (UML, BPMN2.0, SysML, ER) minimal set of strategic tools for enterprise adoption.
Application Development Tools	Build the applications with standardized and consolidated tool sets, and to narrow the focus of the development sets. Multiple COTS Solutions. Review existing ; establish & define which to retain
Build and Deployment Tools	Minimal set of strategic tools for build and deploy.
Defect Tracking	Single consolidated tool.
Development Framework-	Monolithic Applications (legacy self-contained applications independent from other computing applications, update based on needs/funding) and N-Tier Application

➢ Long-Term Vision (2013-2017) - Development Tools	
	Framework with Security Framework.
User Interface Design Tools	Yet to be determined.
Integrated Development Environment	Move toward multiple COTS solutions and tools, and to evaluate and draw upon open source tools, as appropriate, to ensure that developers will be efficient and effective. It will also rely on a minimal set of strategic tools to be adopted enterprise-wide.
Legacy Modernization	Move toward migrating to a thin client such as hyper text Markup Language (HTML) and web applications; create services based upon an approved development framework.
Process Management Tools	Move toward an enhanced and expanded ProPath.
Requirements Management	Move toward the Rational Requisite Pro suite of applications and to configure the tools to support the agile development methodology
Software Change and Configuration Management	Multiple COTS and minimal set of strategic tools for enterprise adoption (Rational Set). Support Open Source development (OSEHRA).
Web Authoring Tools	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Application Testing Software - Standards and tools that provide automated support for the software testing cycle and include such facilities as the management of the overall test process, test development, capture/development of test scripts, replay of test scripts and test case generation for various kinds of testing including unit testing, system testing, regression testing, and integration testing.

➢ Near-Term Vision (2013-2015) - Application Testing Software	
Debugging Test Tools	Use code checkers (automated), IDEs, manual code reviews, 2nd developer review Augment with Test Harnesses; automate test tools based on scripts, buildup script library.
Functional Test Tools	User Acceptance Testing (UA); Agile – acceptance via demonstration of achievement to story.
Load & Performance Testing Tools	Begin enterprise level testing throughout development cycles with selected projects, Standardize enterprise lifecycle testing for all projects. Provide for the ability to test the system and network load while at peak levels, and also provide for testing user response times during peak load periods.
System Testing Tools	Initial operating capability (IOC); Regression Testing; Augment with Independent Validation & Verification (IV&V); Pre-Production; Test of product installation (blackout capability).
Unit Testing Tools	Varies by technology platforms, development teams, deadlines, etc.; Augment with Test drive development with minimal set of standardized tools.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - Application Testing Software	
Debugging Test Tools	VA will continue Debugging Test, VA Tools Use of code checkers (automated), IDEs, manual code reviews, 2nd developer review, and Augment with Test Harnesses, automated test tools based on scripts, build up script library
Functional Test Tools	User Acceptance Testing (UAT), and Agile - acceptance via demonstration of achievement to story.
Load & Performance Testing Tools	Standardized enterprise lifecycle testing for all projects. VA'S target to standardize on a single tool that can effectively load test.
System Testing Tools	Augment existing tools with Independent Validation & Verification; Pre-Productions; and Test of product installation (blackout capability).
Unit Testing Tools	Augment with test-driven development occurs with a minimal set of standardized tools. The provision of a rich set of tools for developers and SQA such that test scripts are written for all software. Test harnesses are written for all services, and interfaces, and all tools are captured in a test suite COTS tool so that a library of scripts, tests and results are maintained for documentation and subsequent regression testing. Provision of stress testing tools that can simulate thousands of simultaneous consumers are available (VA has a tool but use is limited to Enterprise Testing Service).
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Application Delivery Platform Software - Application delivery platform software enables delivery of web-based applications and other web content

➢ Near-Term Vision (2013-2015) - Application Delivery Platform Software	
Application Server Software	Consolidate Enterprise Solutions.
Web Server Software	Consolidate Enterprise Solutions.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - Application Delivery Platform Software	
Application Server Software	Move toward Software Consolidated Enterprise Solutions, and Adopt cloud delivery.
Web Server Software	Move toward Software Consolidated Enterprise Solutions, and Adopt cloud delivery.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Software Engines - Software providing the core functionality or computational logic within a software service or application--the business logic such as object libraries, software development kits, programming frameworks and high-level programming languages

➢ Near-Term Vision (2013-2015) - Software Engines	
Business Process Management Engine	Minimal usage of BPM
Business Rules Management Engine	Combination of home grown and COTS rules engines.
Geographic Information System Engine	Combination of multiple COTS solutions.
Search Engines	Minimum integration with Applications.

➢ Near-Term Vision (2013-2015) - Software Engines	
Context Management	CCOW (Clinical Context Object Workgroup) Implementation. Web and Mobile enabled Context Management.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - Software Engines	
Business Process Management Engine	PMN2.0/BPEL based Minimal set of Strategic BPM products for Enterprise adoption
Business Rules Engine	Minimal set of strategic BRMS products for Enterprise adoption (Drools).
Geographic Information System (GIS) Engine	Minimal set of strategic GIS products for Enterprise adoption, and institute standards based Enterprise GIS Services.
Search Engines	Major Initiative 16 (Transforming Health Care Delivery through Informatics) is introducing a search engine for the support of clinical care. .
Context Management	CCOW (Clinical Context Object Workgroup) Implementation, and Web and Mobile enabled Context Management. Furthermore, Context Management will still be essential as the user moves to web-based and mobile applications. May also be necessary for applications in Benefits to allow user to work with multiple cases and retain context. VA needs to assess the applicability and tool options for web and mobile platforms. For the Web and Mobile enabled Context Management – Product choice may be influenced by EHR.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Integration Software - "Middleware" that lies between the operating system and applications on each side of a distributed computing system (client-server) in a network, or between applications in a Service Oriented Architecture allowing one application to invoke another or to enable data contained in one database to be accessed through another.

➢ Near- Term Vision (2013-2015) - Integration Software	
Enterprise Service Bus (ESB)	No Enterprise Level capability with ESB; some within application use. Enterprise level criteria and governance, standardization of approach and technology, single federated view/access to all VA enterprise services.

➢ Near- Term Vision (2013-2015) - Integration Software	
Service Registry	New Category as of TRM August 2012.
Application Integration Platforms (Service Registry)	A logically single, enterprise level service registry is established. Design time discovery of Services Runtime discovery of Services
SOA Governance	Currently no enterprise level capability; move toward shared services (non-SOA) within domains.
Messaging Oriented Middleware	Point-to-Point messaging without enterprise level standards
Device Integration	Established Health messaging standards. Standards (e.g. HL7, DICOM) based Medical Instruments
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - Integration Software	
Enterprise Service Bus (ESB)	Enterprise level criteria and governance, standardization of approach and technology, single federated view/access to all VA enterprise services.
Service Registry	New Category as of TRM August 2012.
SOA Governance	Enterprise level "System Integration Office" established to provide leadership, governance and architectural design for implementing and maintaining SOA; with authority encompassing development and implementation processes; organizational structures, roles and responsibilities; as well as enabling technologies, tools and infrastructure.
Messaging Oriented Middleware	Message formats and content are standardized and governance established. Messaging is handled through mechanisms (e.g. ESB) that are standardized at an enterprise level.
Device Integration	Established Health messaging standards. Standards (e.g. HL7, DICOM) based Medical Instruments
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

User Interface – Client-side programming frameworks and standards for presentation layer application communications.

➢ Near-Term Vision (2013-2017) - User Interface	
Web UI Framework	Combination of legacy, thick client and web-based frameworks (diminishes over time), Browser Independent Web Frameworks.
Portlets	Initial use of JSR 168, JSR 268, and WebPart based portlets in various applications as VA moves to higher use of web-based solutions Library of reusable services. Library of reusable Portlets.
Rich Internet Application (RIA) Framework-	Proprietary RIA Frameworks. Platform Independent RIA (HTML5, CSS3, JSON, jQuery)
Mobile Framework	IOS, Android and Device Independent Mobile Application Framework.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - User Interface	
Web UI Framework	Combination of legacy, thick client and web based frameworks (diminishes over time)
Portlets	Library of reusable Portlets
Rich Internet Application (RIA) Framework-	Platform Independent RIA (HTML5, CSS3, JSON, jQuery) spanning across the enterprise.
Mobile Framework	Device Independent Mobile Application Framework
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

6 Systems Management

Systems Management- includes standards, software, and hardware for managing and administering VA's IT enterprise and its associated facilities, assets, programs, and projects.

Systems Management technologies support the OneVA ETA sub-segment: IT Services and Capabilities and includes the technologies listed in the diagram.

Benefits: Systems Management utilities will improve infrastructure, network, and application availability, reliability, and disaster recovery.

Additional information regarding Tiers 1, Tier 2, and Tier 3 of the TRM may be found at: http://trm.oit.va.gov/.

Facilities and Infrastructure Management - Standards, HW, and SW for the tracking, maintenance, and care of buildings and real estate, particularly data centers and telecommunications facilities. This also includes infrastructure management standards and software use to acquire, manage, track, and dispose of all assets in inventory.

➢ Near-Term Vision (2013-2015) - Facilities and Infrastructure Management	
Power Monitoring	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long- Term Vision (2013-2017) – Facilities and Infrastructure Management	
Power Monitoring	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Systems Management - Technologies used in managing the operation of an IT environment or system.

➢ Near-Term Vision (2013-2015) - Systems Management	
Alert Management	Enterprise Monitoring with All RPCs, NDCs.
Application Management	Yet to be determined.
Asset Management -	Adopt partial asset management. Expand functionality to encompass all meaningful VA assets, leverage technologies (barcode, RFID, mobile computing, etc.) to enhance to locate, track and manage VA assets, and Single ITAM DB Fully Populated / Federated.
Data Center Automated Tools	Yet to be determined.
Disaster Discovery	Yet to be determined. COOP / BCP to provide.
IT Service Desk	VA will consolidate to a single primary IT Service Desk.
Knowledge Management	Align with Security Information and Event Management (SIEM) / Log Management.
Mobile Device Management	New Category as of TRM August 2012.
Monitoring	Yet to be determined.
Network Performance Optimization	New Category as of TRM August 2012.
Project Management	PMAS.
Remote Desktop Management	Adopt a Single Desktop Support Group, and MSD Tier 1 Desktop Support.
System Change / Configuration Management	Baselines. Crisp.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%2

➢ Near-Term Vision (2013-2015) - Systems Management	
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➢ Long-Term Vision (2013-2017) - Systems Management	
Alert Management	Yet to be determined.
Application Management	End to End Monitoring of all Infrastructure and Applications. (UNMCs / VISNs / Rds / etc.)
Asset Management	Expand Asset Management functionality to encompass all meaningful VA assets, leverage technologies (barcode, RFID, mobile computing, etc.) to enhance to locate, track and manage VA assets. Single ITAM DB Fully Populated / Federated
Data Center Automated Tools	New Category as of TRM August 2012.
Disaster Recovery (Parking Lot)	Yet to be determined.
IT Service Desk	Single enterprise level access method for all Help Desk areas
Knowledge Management (Parking Lot)	Align with Security Information and Event Management (SIEM) / Log Management.
Mobile Device Management	New Category as of TRM August 2012.
Monitoring	Yet to be determined.
Network Performance Optimization	Yet to be determined.
Project Management	Yet to be determined.

➢ Near-Term Vision (2013-2015) - Systems Management	
Remote Desktop Management	Adopt MSD Tier 1 Desktop Support and NSD Desktop Tier II Support.
System Change / Configuration Management	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Operations Management – Includes standards, hardware and software for emergency notification and communication that enable designated individuals to communicate critical information to many others across multiple devices.

Near-Term Vision (2013-2015) – Operations Management	
Emergency Management	New Category as of TRM August 2012.
Human Resources	New Category as of TRM August 2012.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long- Term Vision (2013-2017) - Operations Management	
Emergency Management	New Category as of TRM August 2012.
Human Resources	New Category as of TRM August 2012.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

7 Platforms and Storage

Platforms and Storage includes standards, hardware, and software platforms which support computing applications and data storage.

Platforms and Storage supports the OneVA ETA sub-segment: IT Services and Capabilities and includes the technologies listed in the diagram.

Benefits: The adoption of a utility cloud computing model for server environments will provide the agile, scalable, and reliable infrastructure needed to keep pace with the explosive growth of information and increased variety and uses of VA's strategic information assets.

Additional information regarding Tiers 1, Tier 2, and Tier 3 of the TRM may be found at: http://trm.oit.va.gov/.

Operating Systems - The main control programs that manage the operation of the computer hardware including memory, storage, networking and input and output, and interfaces the hardware to the applications and users.

➢ Near-Term Vision (2013-2015) - Operating Systems	
OS – Desktop/ Laptop	Thin Client (2013-2015). Virtual / Zero Clients
OS – Mainframe	Implement legacy Mainframe Support for Legacy Applications; Mainframe Linux Virtualization Services.
OS – Mobile Device	Consolidate to Enterprise Strategic Solutions (ios/Android).
OS - Server	Consolidate to Enterprise Strategic Solutions (RHEL, Windows Server SP?).
OS – Cluster and Availability	Move towards local Clustering and Local Application Clustering – HA.
Application and OS Deployment	Definitive Software Library – Single source for VA Software Packages. Single Distribution Methodology.
OS Tools	Refer to Systems Management.

Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 12-19). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Near-Term Vision (2013-2015) - Operating Systems

➢ Long-Term Vision (2013-2017) - Operating Systems	
OS – Desktop/ Laptop	Move toward Thin Client. Virtual / Zero Clients.
OS – Mainframe	Legacy Mainframe Support for Legacy Applications; Mainframe Linux Virtualization Services.
OS – Mobile Device	Mobile OS that supports / capable of Zero Client.
OS - Server	Yet to be determined.
OS – Cluster and Availability	Adopt global Application Clustering - Load Balancing.
Application and OS Deployment	Definitive Software Library – Single source for VA Software Packages. Single Distribution Methodology.
OS Tools	Refer to Systems Management.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 12-19). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

End User Computer Devices - Computers designed to be used by a single individual at a time.

➢ Near-Term Vision (2013-2015) - End User Devices	
PCs	32 Bit Desktop (Digest), X86 64 Bit Laptops with TPM, SED (2013). X86 64 Bit Laptops with TPM, SED (Buy) (2014-2015).
Small Form Factor Mobile Devices	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 9-11). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - End User Devices	
PCs	Yet to be determined.
Small Form Mobile Devices	New Category as of TRM August 2012.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 9-11). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Cloud Services / Virtualization - Standards for the provision of private cloud services (infrastructure, platform, or software) to VA or other Government customers.

➢ Near-Term Vision (2013-2015) – Cloud Services / Virtualization	
Virtualization Software	New Category as of TRM August 2012.
Cloud Technologies	Cloud Server (Modular Compute Capacity). Cloud / Web Platforms.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Long -Term Vision (2013-2017) – Cloud Services / Virtualization	
Virtualization Software	New Category as of TRM August 2012.
Cloud Technologies	Currently available computer methodologies.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Peripherals – External devices connected to computers that extend their input/output capabilities, but are not technically part of the computer itself. Internal peripherals are not included here; they are categorized under End User Devices or (in the case of hard drives) Storage. Any VA computer device, such as a CD-ROM Driver or printer that is not part of the essential computer.

➢ Near-Term Vision (2013-2015) - Peripherals	
Input	Yet to be determined.
Output	Yet to be determined.
Multifunction Devices	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) - Peripherals	
Input	Yet to be determined.
Output	Yet to be determined.
Multifunction Devices	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Physical Servers - Server computer hardware and the standards governing it. Comprised of server hardware including entry-level server, mid-range server, mainframe class server and blade servers. [No Tier 3 categories defined/used.]

➢ Near-Term Vision (2013-2015) – Physical Servers	
Blade Servers, Chassis, and Racks	New Category as of TRM August 2012.
Terminal Servers	Yet to be determined.
Extreme Low Energy Servers	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long-Term Vision (2013-2017) – Physical Servers

➢ Near-Term Vision (2013-2015) – Physical Servers	
Blade Servers, Chassis, and Racks	New Category as of TRM August 2012.
Terminal Servers	Yet to be determined.
Extreme Low Energy Servers	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Storage - Standards, Hardware and Software for data storage, including hard drive arrays and enterprise storage management software**.**

➢ Near- Term Vision (2013-2015) – Storage	
Storage	Implement Storage (SAN) ,Storage (NAS), Storage (Object Access Protocol), Storage (Unified), and Storage (iSCI)
Long-Term Backup	Storage (LTO5) , Non-proprietary Connectivity Protocol Enterprise Consolidated Storage
Operational Recovery	Image Based Snapshots - Replication
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long- Term Vision (2013-2017) – Storage	
Storage	Yet to be determined.
Long-Term Backup	Storage (LTOX)/ Cloud Based Service, Non-proprietary Connectivity Protocol and Storage (LTO5)
Operational Recovery	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

Miscellaneous - Any resource that doesn't neatly fit into any of the other Platform categories. (Yet to be determined.)

Telepresence VTC Systems is n/a-Standards, hardware, and software which allow a person to feel as if they are present, give the appearance of being present, and/or have an effect via high-definition video teleconferencing and, sometimes, remote-controlled robotic devices. Telepresence deploys greater fidelity of sight and sound than in traditional VTC and may used for telemedicine and/or telework applications. (Yet to be determined.)

➢ Near- Term Vision (2013-2015) - Miscellaneous	
Telepresence VTC Systems	Yet to be determined.
Other	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

➢ Long- Term Vision (2013-2017) - Miscellaneous	
Telepresence VTC Systems	Yet to be determined.
Other	Yet to be determined.
Reference	Department of Veterans Affairs IT Roadmap FY2013-2020, June 2012 (pp 20-25). Located at: http://vaww.infoshare.va.gov/sites/itstrategy/Library/Department%20of%20Veterans%20Affairs%20IT%20Roadmap%20FY%202013-2020.pdf

APPENDIX D – Bibliography

This document is primarily based on the results of the IT Roadmap Lockdown held in June 2012, and discussions among OIT senior leaders during the subsequent SES Retreat in July 2012. The following list comprises further discovery of authoritative documents.

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